

APPLICATION FOR PATENT



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Title: Emissivity-independent silicon surface temperature measurement

CROSS REFERENCE TO RELATED APPLICATIONS

The present application claims the benefit of priority from United States Provisional Application No. 60/263,522 filed January 24, 2001, the contents of which are incorporated herein by reference.

FIELD AND BACKGROUND OF THE INVENTION

The determination of true surface temperature of Silicon (Si) during the various processes encountered in the fabrication of a microelectronic chip is an important parameter that determines the quality of the manufactured product. One of the methods used in determining the surface temperature is based on remotely sensing the radiation from the silicon surface. If the surface emissivity is known, one can deduce the surface temperature from the remote measurement. However the surface emissivity is usually not known accurately enough, and moreover it is a function of temperature and the surface treatment the silicon is subjected to.

The total radiation from a surface is composed of a self-emitted part and a reflected part. At high temperatures the self-emitted radiation from a Si surface at a given viewing angle has a certain degree of linear polarization as determined by its complex refractive index. If in addition a known source of radiation is reflected from the surface, then this reflected component has a degree of polarization (DOP) that is in opposition to that of the emitted component. As shown previously in an article by one of the present inventors, Balfour L. S. (Leslie Salem), "Infrared polarization thermometry using an imaging radiometer", QIRT 94, Eurotherm Series 42- EETI ed., Paris 1995pp. 103-105, one can obtain a null value for the DOP when the sources of the reflected and emitted components are at the same temperature. This forms the